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Notes on and Descriptions of North American *Eupithecia* (Lepidoptera, Geometridae)

By Frederick H. Rindge[1]

Considerable material in the genus *Eupithecia* has come to hand since the appearance of McDunnough's revision (1949). Some specimens have been sent in for identification, particularly by Mr. James A. Baker and Mr. Bryant Mather, while others were received in the collection of John L. Sperry. The bulk of the material, however, has been collected in the Rocky Mountain states by the author and his wife, assisted by daughters Janet and Barbara. The trips of 1959–1961, inclusive, were undertaken with the assistance of National Science Foundation Grant G-9037.

The present paper increases our knowledge of the distribution of *Eupithecia,* primarily from the Rocky Mountain states, as new data are presented for 46 species. In addition, five taxa, recognized as subspecies by McDunnough, are placed in the synonymy. Two new species are described in this paper and our knowledge of three species, originally known from one sex only, is increased as the hitherto unknown sex is described and its genitalia are illustrated.

To keep the paper to a usable size, the data are presented in a somewhat abbreviated form. Usually only counties are given for each state, rather than the one or more specific localities within their boundaries. The date of capture is by months only, days and years being omitted. If the elevation of the locality is present on the label it is given; unfor-

[1] Curator, Department of Entomology, the American Museum of Natural History.

tunately many of the labels did not include this valuable information.

GENUS *EUPITHECIA* CURTIS

Eupithecia CURTIS, 1825, p. 64. MCDUNNOUGH, 1949, p. 533. MACKAY, 1951, p. 77. RINDGE, 1952, p. 1; 1956, p. 1. ROSS AND EVANS, 1956, p. 36. MCGUFFIN, 1958, p. 53. KIRKWOOD, 1961, p. 45.

Several papers on this genus have appeared since McDunnough's revision in 1949; the more important ones are listed above. New taxa have been described by MacKay, Rindge, and Kirkwood. Distributional data for previously described species were included in the papers of all the above except Kirkwood. Information on life histories, virtually unknown at the time of McDunnough's paper, were given by MacKay, Rindge (1952), and McGuffin. These several papers constitute the major addition to our knowledge of this large genus in the past 13 years.

Eupithecia ornata (Hulst)

Tephroclystis ornata HULST, 1896, p. 267.
Eupithecia ornata, MCDUNNOUGH, 1949, p. 549. MACKAY, 1951, p. 90. ROSS AND EVANS, 1956, p. 37.

The distribution of this species is greater than McDunnough indicated. It has been reported from several different localities in British Columbia (MacKay, p. 90; Ross and Evans, p. 37), and it has been reared from several species of pines. It also occurs in Arizona (Cochise County, April), Colorado (Montrose, Montezuma, Jackson, Boulder, and Routt counties; June, July; 7800–9500 feet), and Wyoming (Carbon, Sheridan, Sublette, and Park counties; July, August; 6900–8800 feet).

Eupithecia columbiata columbiata (Dyar)

Tephroclystis columbiata DYAR, 1904, p. 891.
Eupithecia columbiata columbiata, MCDUNNOUGH, 1949, p. 551. MACKAY, 1951, p. 84. ROSS AND EVANS, 1956, p. 36. MCGUFFIN, 1958, p. 60.

Additional British Columbia records have been published (MacKay, p. 84; Ross and Evans, p. 36), as has an Alberta locality (McGuffin, p. 60). Two new records include eastern Oregon (Baker County, August), and Colorado (Routt County, July, 7600 feet); both of these are based on single female specimens.

Eupithecia maestosa harlequinaria (Dyar)

Tephroclystis harlequinaria DYAR, 1905, p. 29.
Eupithecia maestosa harlequinaria MCDUNNOUGH, 1949, p. 553.

Dyar described this moth from Victoria, British Columbia; it has

heretofore been reported only from southern Vancouver Island. A series of moths from the coastal areas of Washington (Skamania County, July), and Oregon (Yamhill, Marion, and Benton counties; March, April, May, July, October) are referable to this subspecies. These specimens have more brightly and more contrastingly colored wings than do examples from eastern Oregon, which represent nominate *maestosa.*

Eupithecia insolabilis (Hulst)

Tephroclystis insolabilis HULST, 1900b, p. 215.
Eupithecia insolabilis, McDUNNOUGH, 1949, p. 555.

This species was described from Arizona; McDunnough had a single Utah female. Additional records are from Utah (Tooele, Garfield, and Beaver counties; July; 7200–8800 feet), and New Mexico (Lincoln County, July, 7000 feet).

Eupithecia catalinata McDunnough

Eupithecia catalinata McDUNNOUGH, 1944, p. 50; 1949, p. 555.

This species has been known only from a few specimens from southeastern Arizona. It was collected in large numbers in Catron County, New Mexico, July, 9000 feet; additional specimens have been taken in Sandoval County, New Mexico, July, 7900 feet, and in San Juan County, Utah, July, 8800 feet.

Eupithecia edna (Hulst)

Tephroclystis edna HULST, 1896, p. 266.
Eupithecia edna, McDUNNOUGH, 1949, p. 556.

Additional records for this species include Colorado (Montezuma and Montrose counties; late June, 7800–8100 feet), New Mexico (Hidalgo County, June), Arizona (Cochise County, April through September, 5400 feet), and California (Tulare County, June).

Eupithecia owenata McDunnough

Eupithecia owenata McDUNNOUGH, 1944, p. 52; 1949, p. 557.

This species was described from Arizona, without any additional data. Definite localities now include Coconino and Apache counties, Arizona, June, August; Lincoln and Catron counties, New Mexico, July, 7000–9000 feet.

Eupithecia bryanti Taylor

Eupithecia bryanti TAYLOR, 1906b, p. 392. McDUNNOUGH, 1949, p. 569. RINDGE, 1952, p. 1.

The known distribution of this species was given as British Columbia, Alberta, Utah, and California (McDunnough, p. 569); to this Alaska has been added (Rindge, p. 1). The species is more widespread than the above records would indicate. Additional material has come to hand from the Rocky Mountain states. The records here are from Montana (Park and Carbon counties; July, August), Idaho (Blaine County, July, 7000 feet), Wyoming (Sublette, Lincoln, and Carbon counties; July, August; 8000–8400 feet), Colorado (Conejos County, August, 10,000 feet), and Utah (Wasatch and Emery counties; August; 8000–9500 feet). Additional records from the Pacific coast states include Washington (Jefferson and Skamania counties; July) and Oregon (Yamhill County, May, June, July).

Eupithecia undata Freyer

Eupithecia undata FREYER, 1842, p. 54. MCDUNNOUGH, 1949, p. 572.

This species is also more widespread than has been indicated. It has been taken fairly commonly in Wyoming, but in the other states it has been poorly represented. The new records are as follows: Wyoming (Yellowstone National Park; Sublette, Big Horn, Carbon, Lincoln, Sheridan, Crook, and Park counties; June, July, August; 6100–8900 feet), Montana (Park County, July), Idaho (Blaine County, July, 7000 feet), Colorado (Jackson and Montrose counties; July, August; 9000–9500 feet), Nevada (Elko County, July, 8000 feet), and Oregon (Wallowa County, August).

Eupithecia borealis (Hulst)

Tephroclystis borealis HULST, 1898, p. 114.
Eupithecia borealis, MCDUNNOUGH, 1949, p. 573.

To the states already listed for this species, Utah can be added; the record is for Tooele County, July, 7400 feet. Additional localities for some of the remaining states include Wyoming (Park County, July, 6900 feet), Colorado (Larimer County, July, 6600 feet), and New Mexico (Sandoval and Grant counties; July; 6800–7900 feet).

Eupithecia jejunata McDunnough

Eupithecia jejunata MCDUNNOUGH, 1949, p. 574. RINDGE, 1956, p. 3, figs. 1, 2.

McDunnough described this species from two female specimens, the type being from Texas and the paratype from Georgia. Rindge (p. 3, figs. 1, 2) has described and illustrated the male and its genitalia from some specimens from Florida. Additional material has been seen from Florida (Sarasota, Alachua, Manatee, and Escambia counties; Febru-

ary, March), Mississippi (Hinds and Adams counties; February, March, April), and Texas (San Patricio County, February).

Eupithecia castigata (Hübner)

Geometra castigata HÜBNER, "1796" [1809–1813], pl. 89, fig. 456.
Eupithecia castigata, MCDUNNOUGH, 1949, p. 575. MACKAY, 1951, p. 90. RINDGE, 1952, pp. 2, 12.

McDunnough (p. 576) gave the distribution of this species as "general, across the northern half of the continent, extending down the Pacific coast into Oregon and presumably California." MacKay's specific record (p. 90) of Alaska has been added since. In the Rocky Mountains this species occurs in Wyoming (Crook County, July, 6100 feet), Montana (Park County, July), Colorado (Jackson, Routt, Larimer, and Chaffee counties; July; 7400–9000 feet), and New Mexico (Catron County, July, 9000 feet). The species occurs in both coastal and interior Oregon (Tillamook, Marion, Wallowa, and Baker counties; May, June, July), and specimens have been examined from coastal Washington (Skamania and Jefferson counties; June, July).

Eupithecia albipunctata (Haworth)

Phalaena albipunctata HAWORTH, "1810" [1803–1828], p. 360.
Eupithecia albipunctata, MCDUNNOUGH, 1949, p. 576.

The published distribution records for this species from the western United States include only California (McDunnough, p. 577). Additional records are from Washington (Clallam and Skamania counties; July), Oregon (Baker County, June), Montana (Park County, July), Wyoming (Park County, July, 6900 feet), and Colorado (Routt County, July, 7600 feet).

Eupithecia luteata bifasciata (Dyar)

Tephroclystis bifasciata DYAR, 1904, p. 891.
Eupithecia luteata bifasciata, MCDUNNOUGH, 1949, p. 579. MacKay, 1951, p. 90.

This subspecies is known from various British Columbian localities. To these can be added Baker County, Oregon, June. In Catron County, New Mexico, July, 9000 feet, there is a population of this species that is probably correctly placed as this subspecies, notwithstanding the great gap in the known distribution. This southern population appears to be larger and paler than typical British Columbian specimens, but more material is needed to be certain.

Eupithecia kasloata (Dyar)

Tephroclystis casloata (*sic!*) DYAR, 1904, p. 891.

Eupithecia kasloata, McDUNNOUGH, 1949, p. 581.

McDunnough had very little material of this species when he wrote his revision; specimens were on hand from British Columbia and Alberta. In the Rocky Mountains a population occurs that is probably referable to this species; if not conspecific, it is certainly closely related. The records are as follows: Montana (Park County, July), Oregon (Wallowa County, July), Wyoming (Park and Sublette counties; July, August; 6900–8000 feet), Colorado (Conejos County, August, 10,000 feet), and Utah (Sanpete and San Juan counties; July, August; 8800–10,200 feet).

Eupithecia sierrae (Hulst)

Tephroclystis sierrae HULST, 1896, p. 268.
Eupithecia sierrae, McDUNNOUGH, 1949, p. 585.

Southern Utah (Garfield County, July, 7200 feet) can be added to the known distribution of Colorado, New Mexico, Arizona, and California.

Eupithecia bolterii (Hulst)

Tephroclystis bolterii HULST, 1900a, p. 102.
Eupithecia bolterii, McDUNNOUGH, 1949, p. 589.

This species has been taken in Cochise and Yavapai counties, Arizona; March, April; 4300–4600 feet. It apparently flies in considerable numbers in the early spring months.

Eupithecia macdunnoughi Rindge

Eupithecia suspiciosata, McDUNNOUGH (*nec* Dietze), 1949, p. 596.
Eupithecia macdunnoughi RINDGE, 1952, p. 3.

This species was described from the San Francisco Bay area (Napa and Marin counties, California; February and March), with additional specimens being known from Nevada and Utah. It has also been taken in Los Angeles County, California, February, and in considerable numbers in Cochise County, Arizona, March, April, and May, 5400 feet.

Eupithecia nabokovi McDunnough

Eupithecia nabokovi McDUNNOUGH, "1945" [1946], p. 169; 1949, p. 598.

Additional distributional records for New Mexico include Catron, Grant, and Sandoval counties; July; 6800–9000 feet. New state records are for Colorado (Gunnison and Routt counties; July; 7600–9500 feet) and Wyoming (Lincoln and Sublette counties; July; 6200–8000 feet).

Eupithecia terminata Taylor

Eupithecia terminata TAYLOR, 1908, p. 58. MCDUNNOUGH, 1949, p. 605.

In the Rocky Mountains, the recorded range of this taxon is from British Columbia to Colorado. State records are now known from Idaho (Blaine County, July, 6200 feet), Wyoming (Sublette County, July, 8000 feet), and Montana (Park County, July). Additional Colorado localities are Dolores and Routt counties; June, July; 7600–7800 feet. The species is known to occur in Oregon (Crater Lake National Park; Baker County; June, July; 4000 feet), and California (Humboldt County, July).

Eupithecia nimbicolor (Hulst)

Tephroclystis nimbicolor HULST, 1896, p. 269.
Eupithecia nimbicolor, MCDUNNOUGH, 1949, p. 606.

The range of this widely occurring species can be extended into Oregon (Crater Lake National Park; Harney County; June, July, August), and Washington (Hurricane Ridge, Olympic Mountains, June). There are new records for Wyoming (Sublette and Lincoln counties; July; 6200–8000 feet), Colorado (Gunnison, Routt and Dolores counties; July; 7600–9500 feet), and Utah (Sevier County, July).

Eupithecia grata Taylor

Eupithecia grata TAYLOR, 1910, p. 78. MCDUNNOUGH, 1949, p. 610.

McDunnough gave the distribution as "eastern Canada, possibly extending to the western provinces." Three specimens have been examined from the western United States that may belong to this species. The moths are from Utah (Provo, July), Nevada (Verdi), and Oregon (Baker County, July, 4000 feet). More material is needed before the exact status of these examples can be established.

Eupithecia fumosa (Hulst)

Tephroclystis fumosa HULST, 1896, p. 269.
Eupithecia fumosa, RINDGE, 1952, p. 3.
Eupithecia coagulata, MCDUNNOUGH (*nec* Guenée), 1949, p. 613.

This species is transcontinental in distribution; only two records, both from Colorado, were given for the western United States by McDunnough (p. 614). Specimens have come to hand from the following localities: Oregon (Baker and Wallowa counties; June, July, August; 4000 feet), Colorado (Routt County, July, 7600 feet), Utah (Tooele County, July, 7400 feet), and Arizona (Apache County, June).

Eupithecia swettii Grossbeck

Eupithecia swettii GROSSBECK, 1907, p. 346. McDUNNOUGH, 1949, p. 614.

This species has heretofore been known from Quebec to the District of Columbia and Pennsylvania. Two males have been received from Pike and Hinds counties, Mississippi, February and March, that belong to this taxon. Apparently it is more widely distributed than was previously thought.

Eupithecia coagulata Guenée

Eupithecia coagulata GUENÉE, 1857, p. 339. RINDGE, 1952, p. 3.
Eupithecia geminata PACKARD, 1873, p. 58. McDUNNOUGH, 1949, p. 615.

This species is trans-Canadian in distribution, and it is known to occur as far south as Arizona and California (McDunnough, p. 616); however, definite records as to states and localities in the west have not been cited. Material has been examined from the following states: Wyoming (Yellowstone National Park; Teton County; July, August), Idaho (Shoshone County, August, October), Colorado (Larimer, Chaffee, and San Miguel counties; August), Utah (Sanpete, Tooele, and Emery counties; July, August; 7400–8800 feet), Nevada (Elko County, July, 8100 feet), New Mexico (Otero and Grant counties; July, August; 6800 feet), Arizona (Pinal and Coconino counties; June, August), Washington (Walla Walla, Lewis, Skamania, and Jefferson counties; June, July, August), Oregon (Wallowa, Baker, and Multnomah counties; June, July, August), and California (Mendocino County, June, July).

Eupithecia cretaceata (Packard)

Larentia cretaceata PACKARD, 1874a, pl. 1, fig. 3; 1874b, p. 40.
Eupithecia cretaceata, McDUNNOUGH, 1949, p. 618.

This is another widely ranging, trans-Canadian species, with but few published records for the western United States; in fact, McDunnough gives only several California localities (p. 619). Material has been examined from the following localities: California (San Bernardino and Humboldt counties; July), Nevada (Elko County, June, July, 8500 feet), Oregon (Crater Lake National Park; Harney and Wallowa counties; June, July), Washington (Columbia, Yakima, Lewis, and Pierce counties; May, July), Wyoming (Big Horn, Sheridan, Park, Sublette, Teton, and Crook counties; July; 6100–8900 feet), Idaho (Shoshone County, July), Montana (Park and Carbon counties; July, August), Colorado (Jackson, Gunnison, Routt, and Conejos counties; July, August; 7600–10,000 feet), Utah (Tooele and Kane counties; June, July; 7400 feet), and Arizona (White Mountains, June).

Eupithecia nimbosa (Hulst)

Tephroclystis nimbosa HULST, 1896, p. 269.
Eupithecia nimbosa, MCDUNNOUGH, 1949, p. 620.
Tephroclystis plenoscripta HULST, 1900a, p. 103. New synonymy.
Eupithecia plenoscripta plenoscripta, MCDUNNOUGH, 1949, p. 619.

More material of this species has come to hand since McDunnough's revision was published. At that time there was doubt as to the distinctness of *nimbosa* (described from Arizona) and *plenoscripta* (described from Yellowstone National Park, Wyoming). An examination of 40 adults and nine male and 11 female genitalic preparations makes it fairly certain that the populations represented by these two names belong to a single species. The status of *bindata,* described from Pullman, Washington and reported from Plumas County, California (McDunnough, p. 620), remains unsettled, as no new material has come to hand.

The species appears to be rather widespread in the Rocky Mountains, extending from Arizona to the Canadian border. New records for this population are as follows: New Mexico (Hidalgo and Grant counties; June, July; 6800 feet), Colorado (Routt, Gunnison, and Montrose counties; June, July: 7600–9500 feet), Oregon (Harney and Baker counties; June, July; 4000 feet), Montana (Park County, July), Idaho (Shoshone County, August), Wyoming (Crook, Sublette, and Park counties; July, August; 6100–8000 feet).

Eupithecia multistrigata (Hulst)

Tephroclystis multistrigata HULST, 1896, p. 270.
Eupithecia multistrigata, MCDUNNOUGH, 1949, p. 626.

This species is widespread in the western United States. Specimens have been captured in the following states: California (San Bernardino, Mono, Mendocino, Shasta, and Siskiyou counties; March, June, July, August, September), Oregon (Crater Lake National Park; Baker and Wallowa counties; July, August, September; 4000 feet), Washington (Walla Walla and Yakima counties; August, September), Idaho (Shoshone and Blaine counties; July; 7000 feet), Wyoming (Yellowstone National Park; Sublette, Teton, Fremont, Sheridan, Carbon, and Park counties; July, August; 6900–8800 feet), Montana (Park County, August), North Dakota (North Roosevelt National Park, July), Utah (Juab, Tooele, Beaver, San Juan, and Sevier counties; July, August, September; 7400–8800 feet), Nevada (Elko County, July, August), Colorado (Routt, San Miguel, Hinsdale, Moffat, Chaffee, Gunnison, and Montrose counties; June, July; 7600–9500 feet), Arizona (Gila and Yuma counties; March, April), and New Mexico (Frijoles Canyon, September).

Eupithecia perfusca perfusca (Hulst)

Tephroclystis perfusca HULST, 1898, p. 116.
Eupithecia perfusca perfusca, MCDUNNOUGH, 1949, p. 628.
Tephroclystis cootenaiata (sic!), DYAR, 1904, p. 890. New synonymy.
Eupithecia perfusca kootenaiata MCDUNNOUGH, 1949, p. 629. ROSS AND EVANS, 1956, p. 37. MCGUFFIN, 1958, p. 65.
Eupithecia alberta TAYLOR, 1906a, p. 103. New synonymy.
Eupithecia perfusca alberta, MCDUNNOUGH, 1949, p. 630. MCGUFFIN, 1958, p. 64.

Many specimens of this species have been collected and received for identification since the appearance of McDunnough's revision. Those states that are represented by long series of specimens include, particularly, Utah, New Mexico, Colorado and Oregon. McDunnough considered *kootenaiata* "scarcely separable from the nimotypical form," and *alberta* "a very doubtful race." Material is now available from all the western states, thus indicating a very general distributional picture. *Salix, Alnus,* and *Betula* are given as the food plants for the specimens occurring in British Columbia and Alberta, and their life histories are apparently similar (McGuffin, pp. 64, 65). No good differences have been found between the so-called western subspecies of *perfusca,* so the two racial names are placed in the synonymy.

Specimens have been examined from the following localities in the western United States: Utah (Juab, Salt Lake, Tooele, Beaver, Grand, Sanpete, Wasatch, and Utah counties; July, August, September; 7400–10,200 feet), Nevada (Elko and Washoe counties; July, August, September; 8500 feet), California (San Bernardino County, June, July), Arizona (White Mountains, June), New Mexico (Catron and Sandoval counties; July; 7900–9000 feet), Colorado (Jackson, Gunnison, Routt, Chaffee, Larimer, Montrose, Hinsdale, and Garfield counties; June, July; 7400–9500 feet), Wyoming (Sublette and Teton counties; August; 8400 feet), Montana (Park County, July), Idaho (Latah, Lemhi, and Blaine counties; July, September; 5200–6200 feet), Oregon (Harney, Baker, Wallowa, Jefferson, and Crook counties; June, July, August, September, October; 4000–7100 feet), and Washington (Walla Walla County, July).

Eupithecia hanhami Taylor

Eupithecia hanhami TAYLOR, 1906b, p. 391. MCDUNNOUGH, 1949, p. 631.

This taxon has been known heretofore only from Vancouver Island, British Columbia. Two additional specimens have come to hand, and these indicate a considerably greater range along the Pacific Coast than

was indicated previously. These moths are a female from Tillamook, Tillamook County, Oregon, June, and a male from Klamath, Del Norte County, California, June.

Eupithecia georgii McDunnough

Eupithecia georgii McDUNNOUGH, 1929, p. 67; 1949, p. 639.

This species occurs throughout the western United States except for Arizona and New Mexico. Records, by states, are as follows: Washington (Olympic National Park; Thurston, Lewis, and Kittitas counties; June, July), Oregon (Crater Lake National Park; Baker, Josephine, Marion, Hood River, Lincoln, Yamhill, Crook, Harney, and Wallowa counties; May through October), California (Siskiyou, Placer, Shasta, Glenn, San Bernardino, Mendocino, Modoc, and Mariposa counties; April, June, July), Nevada (Elko County, July, 8500 feet), Utah (Utah and Tooele counties; July; 7400 feet), Colorado (San Miguel and Routt counties; July; 7600 feet), Wyoming (Park County; July, 6900 feet), Montana (Glacier National Park; Carbon County; July), and Idaho (Shoshone, Blaine, Latah, and Lemhi counties; May, June, July; 3500–6200 feet).

Eupithecia niphadophilata (Dyar)

Tephroclystis niphadophilata DYAR, 1904, p. 890.
Eupithecia niphadophilata, McDUNNOUGH, 1949, p. 641. McGUFFIN, 1958, p. 65.

McDunnough (p. 641) gave British Columbia, Montana, Wyoming, Colorado, and Utah as the known distribution of this species. To these areas McGuffin (p. 65) has added Alberta. Additional localities include Oregon, Idaho, and New Mexico. This species is apparently widespread throughout most of the Rocky Mountains where its food plant, *Juniperus communis* Linnaeus (McGuffin, p. 65), occurs.

Specific localities include the following: Oregon (Wallowa County, August, September), Idaho (Lemhi County, August, 5200 feet), Montana (Carbon County, July, August), Wyoming (Teton, Sublette, and Carbon counties; July, August; 8000–8800 feet), Colorado (Montrose County, August, 9500 feet), Utah (Utah, Wasatch, Sanpete, Emery, Sevier, Beaver, and Kane counties; July, August; 8000–10,200 feet), and New Mexico (Sandoval County, July, 7900 feet).

Eupithecia subcolorata (Hulst)

Tephroclystis subcolorata HULST, 1898, p. 114.
Eupithecia subcolorata, McDUNNOUGH, 1949, p. 642.

This is another species that is more widespread than has previously been indicated. Specimens are on hand from the following locations: Arizona (Gila, Apache, Cochise, Yavapai, Pima, and Coconino counties; June, July, August, September; 5000–6100 feet), New Mexico (Catron, Sandoval, Grant, Lincoln, and Otero counties; July; 6800–9000 feet), Colorado (San Miguel and Routt counties; July; 7600 feet), Utah (Utah, Garfield, Tooele, Sanpete, Beaver, and Grand counties; July, August; 7400–10,200 feet), Oregon (Wallowa and Baker counties; June, July, August), and Idaho (Shoshone County, June).

Eupithecia appendiculata McDunnough

Eupithecia appendiculata McDUNNOUGH, "1945" [1946], p. 170; 1949, p. 642.

Heretofore this species has been known only from Utah (Salt Lake County) and California (Plumas, Napa, Lake, and San Bernardino counties; July, September). Additional specimens have been taken in Utah (Tooele County, July, 7400 feet), Colorado (Mesa Verde National Park; Routt and Jackson counties; July; 7600–9000 feet), and Idaho (Blaine County, July, 7000 feet). Material is also known from the San Pedro Martir Mountains of Baja California Norte, Mexico, May, 6500 feet.

Eupithecia phyllisae, new species

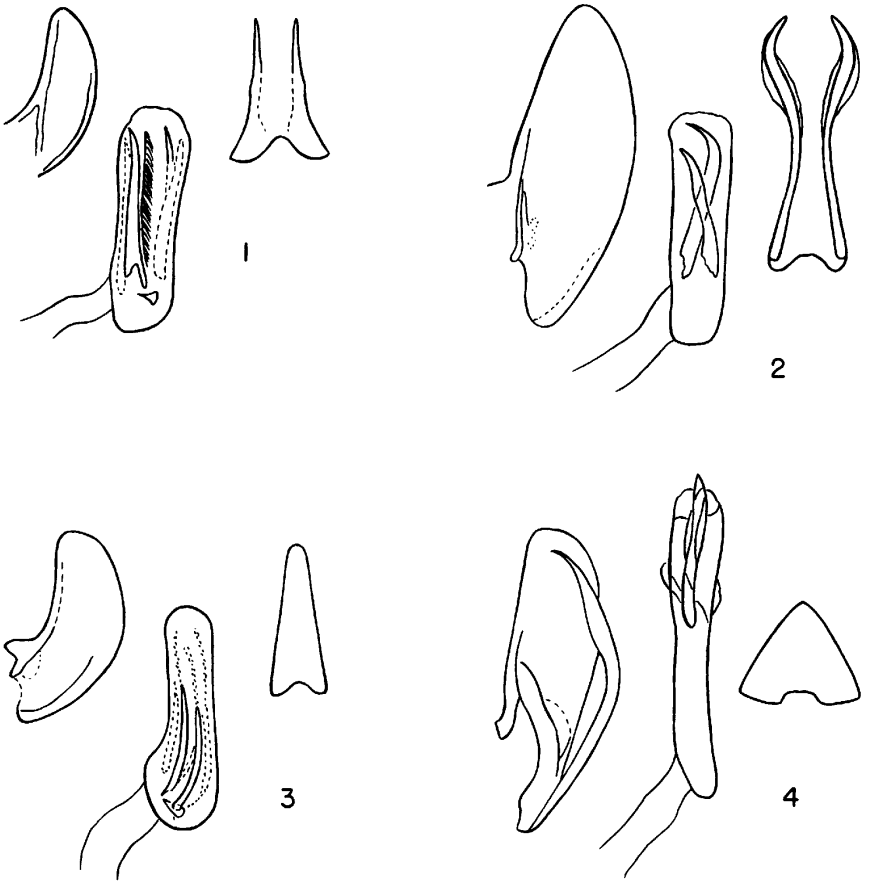
Figures 1, 5

This is a small species with bicolored reddish brown and grayish black wings that occurs in New Mexico. The maculation is like that of *tenuata* Hulst, and the genitalia also indicate a relationship with this species.

MALE: Head, palpi rather short, pale buff; antennae shortly, finely, and evenly ciliate.

UPPER SURFACE OF WINGS: Forewings with ground color pale grayish white, heavily overlain with pale reddish brown scales, with upper portion of median area broadly grayish black; t. a. and t. p. lines pale, poorly defined except by margins of smoky-colored median patch; lower portion of median area reddish brown; outer area of wing along costa and opposite cell with scattered grayish black and brownish red scales, forming two nebulous dark areas, and with small whitish spots in cell M_3 and above tornus; fringe whitish, checkered with dark gray opposite vein endings. Hind wings concolorous with forewings, with sinuate, grayish black, median band and brownish red extradiscal band, separated by prominent stripe of ground color.

UNDER SURFACE OF WINGS: All wings pale gray, lightly marked with



FIGS. 1–4. Male genitalia of *Eupithecia*. The right valve is on the left, the aedeagus is in the center, and the ventral plate is on the right. 1. *E. phyllisae*, new species, paratype, Horseshoe Springs Camp, Sandoval County, New Mexico, July 30, 1961 (F., P., and J. Rindge). 2. *E. stellata* (Hulst), Valley View Lodge, Routt County, Colorado, July 13, 1956 (F. and P. Rindge). 3. *E. hohokamae*, new species, holotype, Southwestern Research Station of the American Museum of Natural History, Cochise County, Arizona, February 16, 1961 (M. A. Cazier). 4. *E. sinuata* McDunnough, Parks, Coconino County, Arizona, August 14, 1958 (R. H. Reid).

gray or pale grayish brown scales, particularly in median and subterminal areas of all wings, forming two indistinct bands.

LENGTH OF FOREWING: 7.0 to 8.5 (holotype) mm.

FEMALE: Similar to male.

LENGTH OF FOREWING: 7.0 to 9.0 mm.; allotype, 8.0 mm.

MALE GENITALIA: Hair pencils of segment IX feebly developed;

uncus with bifid apex, upper hook pointed, lower lobe rounded; valves short, sacculus slightly swollen, apical portion of valve tapering; aedeagus large, longer than combined lengths of uncus, tegumen, and saccus, in width almost equal to width of base of valve; vesica armed with elongate, median spinose process, with an elongate, sclerotized process on left side, gradually tapering to point from wide bicuspid base, with small, median, transverse, basal, sclerotized piece, and with terminal, isolated, sclerotized piece on right side. Ventral plate of segment VIII with lateral edges narrowly sclerotized for length of segment, pointed apically; basal areas on both sides weakly sclerotized and extending part way posteriorly, not meeting medially, and with entire median area membranous.

FEMALE GENITALIA: Ductus bursae short, membranous; corpus bursae elongate, becoming slightly swollen anteriorly; right side membranous, particularly posteriorly and medially, with right margin lightly sclerotized almost to anterior end of corpus bursae and terminating ventrally in medially recurved ductus seminalis; left side anteriorly completely covered with fine spines, extending three-fourths of distance to ductus bursae, with marginal row of very long, thin spines, the spination tending to become reduced on left side laterally; small, elliptical area of short spines extending dorsally on left side below ductus bursae.

TYPES: Holotype, male, Horseshoe Springs Camp, 2 miles west of La Cueva, Sandoval County, New Mexico, July 31, 1961, 7900 feet (F., P., and J. Rindge); allotype, female, same data but July 29, 1961. Paratypes, three males and one female, same data as types, July 28 and 30, 1961; two females, Bursum Camp, 18 miles east of Alma, Catron County, New Mexico, July 15, 1961, 9000 feet (F., P., and J. Rindge). All the type material is in the collection of the American Museum of Natural History.

REMARKS: Eight specimens and five genitalic dissections were studied. This small species is similar to *tenuata* Hulst, but it appears to be slightly larger and more heavily marked. The smoky gray patch of the forewings seems to be slightly bigger and more rounded.

The male genitalia of *phyllisae* can be distinguished from those of *tenuata* by the stouter aedeagus, the larger amount of spining in the vesica, and by the more widely separated lateral projections of the ventral plate. In the female, the large membranous area on the right side and posteriorly, with the ductus seminalis arising anteriorly and the spined area restricted to the left side and anteriorly, are characteristic of this species.

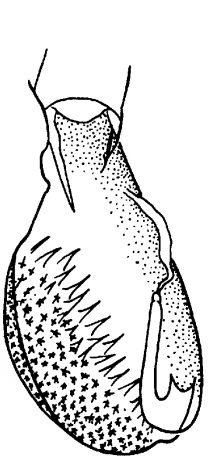
This taxon is named for my wife, Phyllis Rindge, who has ac-

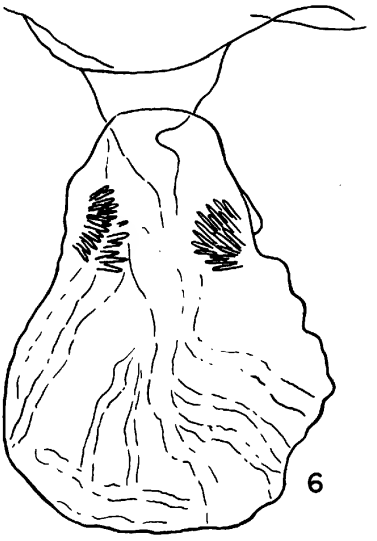
companied me on many field trips and helped collect this series of moths.

Eupithecia agnesata Taylor

Eupithecia agnesata TAYLOR, 1908, p. 57.
Eupithecia agnesata agnesata, MCDUNNOUGH, 1949, p. 648.
Eupithecia barnesi CASSINO AND SWETT, 1922, p. 167. New synonymy.
Eupithecia agnesata barnesi, MCDUNNOUGH, 1949, p. 649.

Specimens have been collected from the following new localities: Wyoming (Teton and Carbon counties; July, August; 8800 feet),





FIGS. 5, 6. Female genitalia of *Eupithecia,* ventral view. 5. *E. phyllisae,* new species, allotype, Horseshoe Springs Camp, Sandoval County, New Mexico, July 29, 1961 (F., P., and J. Rindge). 6. *E. sperryi* McDunnough, Bursum Camp, Catron County, New Mexico, July 12, 1961 (F., P., and J. Rindge).

Colorado (Routt County, July, 7600 feet), Oregon (Crater Lake National Park; Baker, Umatilla, and Josephine counties; June, July, August; 4000 feet), California (Siskiyou, Plumas, Tuolumne, San Bernardino, and San Diego counties; June, July, August, November).

While no topotypical material of *barnesi* (Monachee Meadows, Tulare County, California) has been examined, a small number of California specimens from all over the state have been studied and compared with material from other localities. On the basis of this study it seems best to place *barnesi* in the synonymy.

Eupithecia stellata (Hulst)

Figure 2

Tephroclystis stellata HULST, 1896, p. 270.
Eupithecia stellata, MCDUNNOUGH, 1949, p. 651.

The type of this species is labeled "Col." Definite records from the Rocky Mountains include Colorado (Routt County, July, 7600 feet) and New Mexico (Otero and Sandoval counties; July, August; 7900 feet).

The male genitalia have the hair pencils of segment IX present. The valves are simple and elongate, tapering from the center. The aedeagus is much shorter than the combined lengths of the uncus, tegumen, and saccus; the vesica has two strongly sclerotized spines, crossing medially and curved apically. The ventral plate of segment VIII consists of two very long and slender rods, concave medially, recurved and slightly more heavily sclerotized apically.

Eupithecia niveifascia (Hulst)

Tephroclystis niveifascia HULST, 1898, p. 115.
Eupithecia niveifascia niveifascia, MCDUNNOUGH, 1949, p. 652.
Eupithecia perbrunneata TAYLOR, 1906b, p. 395. New synonymy.
Eupithecia niveifascia perbrunneata, MCDUNNOUGH, 1949, p. 653.

Additional material from the northern Rocky Mountain states indicates that *perbrunneata,* described from Kaslo, British Columbia, should be placed in the synonymy. That northern specimens tend to be slightly larger and darker than those from the southern Rocky Mountains is probably clinal variation.

New localities for this species are as follows: New Mexico (Sandoval, Grant, and Catron counties; July; 6800–9000 feet), Colorado (Rocky Mountain National Park; Boulder, Chaffee, Montrose, and Jackson counties; June, July, August; 7800–9500 feet), Utah (Beaver, Grand, and San Juan counties; July; 8800–9200 feet), Nevada (Elko County, July), Wyoming (Sublette, Big Horn, and Park counties; July, August; 6900–8900 feet), and Montana (Carbon and Park counties; July, August).

Eupithecia flavigutta (Hulst)

Tephroclystis flavigutta HULST, 1896, p. 268.
Eupithecia flavigutta, MCDUNNOUGH, 1949, p. 655.

New additional localities for the known distribution of this species are in Colorado (Chaffee County, July) and Arizona (Cochise and Pima counties; June, July, August; 5400 feet). In addition, the species

occurs in New Mexico (Hidalgo, Sandoval, Grant, and Catron counties; June, July; 6800–9000 feet).

Eupithecia sperryi McDunnough

Figure 6

Eupithecia sperryi McDUNNOUGH, 1939, p. 250; 1949, p. 656.

This species has been known only from males collected in the White Mountain region of Arizona. A series of both sexes has been taken in Catron County, New Mexico, July, 9000 feet.

The female of this species is similar to the male. The female genitalia are composed of a short, triangular, membranous ductus bursae, which becomes weakly sclerotized before joining the corpus bursae dorsally. The corpus bursae is pear-shaped and membranous; laterally, on each side anterior to the junction of the ductus bursae, is a small spinose patch. The ductus seminalis arises ventrally from about the middle of the corpus bursae and is directed anteriad.

Eupithecia dichroma McDunnough

Eupithecia dichroma McDUNNOUGH, "1945" [1946], p. 173; 1949, p. 656.

This species has been known only from the unique type, a female from Alta, Salt Lake County, Utah. A few specimens, from widely scattered localities, have come to hand that appear to be correctly assigned to this species. The data are as follows: Utah (Beaver County, July, 8800 feet), New Mexico (Grant County, July, 6800 feet), Arizona (Cochise County, April, 5400 feet), Colorado (Boulder County, June, 9500 feet), Oregon (Klamath, Jefferson, and Yamhill counties; May, June, July), and Washington (Skamania County, July).

The male genitalia are very similar to those of *rindgei* McDunnough and *johnstoni* McDunnough. More material is needed before an accurate comparison can be made between the genitalia of these three species.

Eupithecia columbrata McDunnough

Eupithecia togata var. *columbrata* McDUNNOUGH, 1940, p. 40.
Eupithecia columbrata, McDUNNOUGH, 1949, p. 660.

This species is known from southern British Columbia and the adjacent regions in Washington (McDunnough, p. 660). Additional localities are in Idaho (Shoshone County, July, 2728 feet), Washington (Rosemary Inn, Lake Crescent; Yakima County; July, August), and Oregon (Yamhill County, July).

Eupithecia hohokamae, new species

Figures 3, 7

This species is related to *scabrogata* Pearsall. The present species has pale grayish brown forewings, with two dark gray cross lines paralleling the outer margin, and tends to have the veins marked with black in the t. p. line. This taxon flies in southern Arizona in the very early spring months.

MALE: Head, palpi very short; antennae very shortly ciliate.

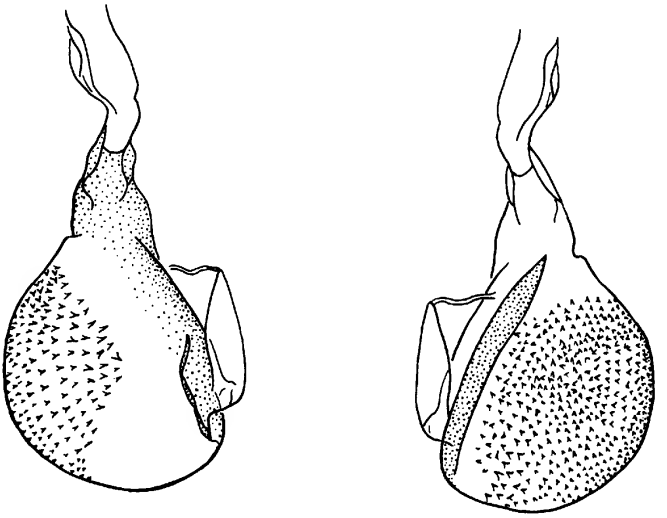


FIG. 7. Female genitalia of *Eupithecia hohokamae*, new species, allotype, Southwestern Research Station of the American Museum of Natural History, Cochise County, Arizona, February 12, 1961 (M. A. Cazier). Ventral view on the left, dorsal view on the right.

UPPER SURFACE OF WINGS: Forewings elongate, pointed; pale gray, overlain with grayish brown and blackish brown scales; median and t. p. lines subparalleling outer margin after leaving costa, dark, with included veins tending to be black; median and subterminal areas pale, contrasting with cross lines; terminal area dark; terminal line blackish brown. Hind wings whitish gray, without maculation except for small discal spot and traces of cross lines along anal margin.

UNDER SURFACE OF WINGS: Forewings dull gray, becoming paler distally, shaded basally with pale grayish brown; discal spot elongate, dark; maculation of upper surface weakly indicated. Hind wings whit-

ish gray, with scattered brown scales; discal spot small; extradiscal line weakly indicated.

LENGTH OF FOREWING: 11 to 12 mm.; holotype, 11 mm.

FEMALE: Similar to male, but forewings above more heavily and evenly overlain with dark gray scaling, obscuring nearly all maculation; rarely with light or dark brown area extending through cell to apex of wing.

LENGTH OF FOREWING: 10 to 12 mm.; allotype, 10 mm.

MALE GENITALIA: Hair pencils of segment IX present; valves short and chunky, apically rounded; aedeagus slightly longer than combined lengths of uncus, tegumen, and saccus, anterior one-half swollen to almost twice width of posterior portion; vesica armed with elongate sclerotized piece, anterior end bifid, right side with transverse extension, median area concave, central region of vesica with lateral spiculate bands, and with posterior sclerotized or spiculate area. Ventral plate elongate, evenly tapering, rounded apically.

FEMALE GENITALIA: Ductus bursae membranous, tapering anteriorly; corpus bursae somewhat pear-shaped, posterior end lightly sclerotized and with collar; sclerotized area extending down right side, with ductus seminalis arising anteriorly, then sharply curving posteriorly; ventral surface of corpus bursae membranous except for spinose area on left side; dorsal surface with more extensive spinose area and with elongate, sclerotized, inwardly directed strip between spinose area and ductus seminalis, paralleling right side.

TYPES: Holotype, male, Southwestern Research Station of the American Museum of Natural History, 5 miles west of Portal, Cochise County, Arizona, February 16, 1961, 5400 feet (M. A. Cazier); allotype, female, same data, February 12, 1961. Paratypes, all from Arizona: 20 males and 33 females, same data as types, March 5, 1956 (Cazier and Ordway), February 12 to March 4, 1961 (M. A. Cazier; C. and M. Cazier); 19 males and three females, Mayer, Yavapai County, February 12 to March 11, 1961, 4300 feet (R. F. Sternitzky) one male, Redington [Pima County]. All the type material is in the collection of the American Museum of Natural History.

REMARKS: Seventy-eight specimens and 11 genitalic dissections were studied. This species can be distinguished from *scabrogata* Pearsall, with which it flies, by the more definite pattern of the forewings of the male. The maculation of the females of these two species is very similar, but *hohokamae* tends to have the anal margin of the secondaries more distinctly patterned.

The genitalia of the male of the new species can be separated from

those of *scabrogata* by the heavier armature of the vesica; those of the female, by the more anterior origin of the ductus seminalis.

Eupithecia sinuata McDunnough

Figure 4

Eupithecia sinuata McDUNNOUGH, 1946, p. 87; 1949, p. 591.

McDunnough described this species from the female. Three males are now at hand. The localities are Turkey Creek Road, White Mountains, Arizona, June 23, 1935 (J. A. Comstock), and Parks, Coconino County, Arizona, August 14, 1958 (R. H. Reid). The male antennae are bifasciculate basally, tending to become trifasciculate distally, and the ciliations are slightly longer than the height of the antenna when viewed laterally.

The male genitalia have elongate valves, with a strongly developed and well-sclerotized arm, extending from the base of the valve almost to the apex; shortly beyond the middle of the arm there is a swollen area, and the terminal portion is tapered and curved inwardly. The aedeagus is long and slender, and the vesica is armed with two elongate, slender rods, pointed apically, appearing superimposed when viewed ventrally, in length over one-half as long as the length of the aedeagus. The hair pencils are present on segment IX. The ventral plate of segment VIII is scarcely differentiated, apparently being short, broad, and triangular.

The male antennae and genitalia indicate a relationship with *shirleyata* Cassino and Swett and *redingtonia* McDunnough.

The species also occurs in New Mexico, as two females are known from Grant County, July, 6800 feet.

Eupithecia anticaria Walker

Eupithecia anticaria WALKER, 1862, p. 1241. McDUNNOUGH, 1949, p. 672.

The only Rocky Mountain locality given by McDunnough was Arizona. The species occurs in all the mountain states from the Canadian to the Mexican border. The localities are as follows: Wyoming (Teton, Sublette, and Crook counties; July, August; 6100–8000 feet), Idaho (Blaine County, July, 7000 feet), Montana (Park County, July), Colorado (Chaffee, Larimer, and Routt counties; June, July; 7400–7600 feet), Utah (Bryce National Park; Tooele, San Juan, Beaver, and Grand counties; July; 7400–9200 feet), New Mexico (Lincoln, Catron, and Sandoval counties; June, July; 7000–9000 feet), and Arizona (White Mountains; Pima County; June, July).

Eupithecia pertusata McDunnough

Eupithecia pertusata McDUNNOUGH, 1938, p. 236; 1949, p. 673.

This species has been known only from southwestern Texas. Two males, from Lincoln County, New Mexico, July, 7000 feet, can be assigned to this species on the basis of their genitalia.

Eupithecia classicata Pearsall

Eupithecia classicata PEARSALL, 1909, p. 128. McDUNNOUGH, 1949, p. 674.

This species was known to McDunnough by two males from southern Arizona. Among some material submitted for identification from J. H. Baker was a single worn male from Baker County, Oregon, July.

A dissection of the genitalia proved this specimen to be referable to this species. The wings of this specimen are larger and paler (and more worn) than those of the two Arizona specimens, but the reddish discal streak is present.

Eupithecia nevadata geneura Swett and Cassino

Eupithecia geneura SWETT AND CASSINO, 1919, p. 108.
Eupithecia nevadata geneura, McDUNNOUGH, 1949, p. 682.

The above name was used by McDunnough for specimens of this species from Utah and Colorado. Additional material has come to hand from the following: Colorado (El Paso and Larimer counties; April), New Mexico (Hidalgo County, June), and Arizona (Cochise and Yavapai counties; February, March, April; 4300–4500 feet).

BIBLIOGRAPHY

CASSINO, SAMUEL E., AND LOUIS W. SWETT
1922. Some new Geometridae. Lepidopterist, vol. 3, pp. 167–174.
CURTIS, JOHN
1825. British entomology. London, Lovell Reeve and Co., vol. 6, pt. 2, pl. 64.
DYAR, HARRISON G.
1904. The Lepidoptera of the Kootenai district of British Columbia. Proc. U. S. Natl. Mus., vol. 27, pp. 779–938.
1905. New North American Lepidoptera and synonymical notes. Proc. Ent. Soc. Washington, vol. 7, pp. 29–39.
FREYER, C. F.
1842. Neuere Beiträge zur Schmetterlingskunde. Augsburg, vol. 4, pp. 1–167, pls. 289–384.
GROSSBECK, JOHN A.
1907. Notes on *Eupithecia*, with descriptions of new species. Ent. News, vol. 18, pp. 342–350.
GUENÉE, A.
1857. Histoire naturelle des insectes. Species général des lépidoptères. Paris,

vol. 10, pp. 1–584.

HAWORTH, A. H.

"1810" [1803–1828]. Lepidoptera Brittanica. London, pp. i–xxxvi, 1–609.

HÜBNER, JACOB

"1796" [1809–1813]. Sammlung Europäischer Schmetterlinge, Geometrae. Augsburg, pt. 5, pp. 1–24, pls. 1–113.

HULST, GEO. D.

1896. A classification of the Geometrina of North America, with descriptions of new genera and species. Trans. Amer. Ent. Soc., vol. 23, pp. 245–386, pls. 10, 11.

1898. Descriptions of new genera and species of the Geometrina of North America. Canadian Ent., vol. 30, pp. 113–121.

1900a. Some new species of Geometridae. *Ibid.*, vol. 32, pp. 102–107.

1900b. New species of Lepidoptera. Jour. New York Ent. Soc., vol. 8, pp. 215–225.

KIRKWOOD, CARL W.

1961. A new *Eupithecia* from Arizona (Lepidoptera, Geometridae). Bull. Southern California Acad. Sci., vol. 60, pp. 45–46, pl. 16.

MCDUNNOUGH, JAMES H.

1929. Synonymic notes on Canadian Eupithecias (Geomet., Lepid.). Canadian Ent., vol. 61, pp. 59–69, figs. 1–4.

1938. Some apparently new Texan Eupithecias. *Ibid.*, vol. 70, pp. 236–242, pl. 20.

1939. New species of Geometridae with notes, II. *Ibid.*, vol. 71, pp. 249–258, figs. a–c.

1940. *Eupithecia* notes. *Ibid.*, vol. 72, pp. 35–40, figs. 1–8.

1944. The palpata group of the genus *Eupithecia* with notes and descriptions (Lepidoptera, Geometridae). *Ibid.*, vol. 76, pp. 45–56.

"1945" [1946]. New North American Eupithecias I (Lepidoptera, Geometridae). *Ibid.*, vol. 77, pp. 168–176, figs. 1–8.

1946. New North American Eupithecias, II (Lepidoptera Geometridae). *Ibid.*, vol. 78, pp. 86–89, figs. 1–4.

1949. Revision of the North American species of the genus *Eupithecia* (Lepidoptera, Geometridae). Bull. Amer. Mus. Nat. Hist., vol. 93, pp. 533–728, figs. 1–20, pls. 26–32.

MCGUFFIN, W. C.

1958. Larvae of the Nearctic Larentiinae (Lepidoptera: Geometridae). Canadian Ent., vol. 90, suppl. 8, 104 pp., figs. 1–216.

MACKAY, MARGARET R.

1951. Species of *Eupithecia* reared in the Forest Insect Survey in British Columbia (Lepidoptera: Geometridae). Canadian Ent., vol. 83, pp. 77–91, pls. 1–4.

PACKARD, A. S.

1873. Descriptions of new American Phalaenidae. Fifth Rept. Peabody Acad. Sci., pp. 52–81.

1874a. Catalogue of the Phalaenidae of California. Proc. Boston Soc. Nat. Hist., vol. 16, pp. 13–40, pl. 1.

1874b. Descriptions of new North American Phalaenidae. Sixth Rept. Peabody Acad. Sci., pp. 39–53.

PEARSALL, RICHARD F.
1909. New Geometridae and notes [Lepidoptera, Geometridae]. Proc. Ent. Soc. Washington, vol. 11, pp. 119–132.
RINDGE, FREDERICK H.
1952. Taxonomic and life history notes on North American *Eupithecia* (Lepidoptera, Geometridae). Amer. Mus. Novitates, no. 1569, pp. 1–27, figs. 1–8.
1956. Descriptions of and notes on North American Geometridae (Lepidoptera). *Ibid.*, no. 1784, pp. 1–19, figs. 1–19.
ROSS, D. A., AND D. EVANS
1956. Annotated list of forest insects of British Columbia, part III—*Eupithecia* spp. (Geometridae). Proc. Ent. Soc. British Columbia, vol. 52, pp. 36–38.
SWETT, L. W., AND SAMUEL E. CASSINO
1919. Some new geometrids. Lepidopterist, vol. 3, pp. 105–110.
TAYLOR, GEO. W.
1906a. On the species of *Eupithecia* occurring at Calgary, Alberta, with descriptions of four supposed to be new. Canadian Ent., vol. 38, pp. 101–104.
1906b. Some new Geometridae from British Columbia. *Ibid.*, vol. 38, pp. 389–405.
1908. Notes on the Lepidoptera of Kaslo, B. C., with descriptions of seven new species. *Ibid.*, vol. 40, pp. 54–60, 98–100.
1910. Descriptions of new species of *Eupithecia* from eastern America. *Ibid.*, vol. 42, pp. 77–83.
WALKER, FRANCIS
1862. List of the specimens of lepidopterous insects in the collection of the British Museum. London, British Museum (Natural History), pt. 24, pp. 1021–1280.